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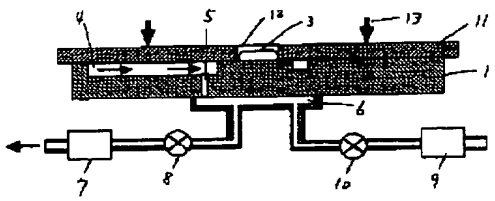
(54) **MAGNETIC TRANSFER DEVICE**

(57) Abstract:

PROBLEM TO BE SOLVED: To make a master and a slave disk extensively closely stuck to each other from the inner circumference over to the outer circumference, by providing plural recessed parts extending radially from a central position of the slave disk in the magnetic transfer surface of the master.

SOLUTION: A spindle 3 of the master 1 is inserted into a center hole 12 of the slave disk 11, and an exhaust valve 8 is closed and an inlet valve is opened to operate a suction pump 9. Air fed under pressure into a chamber 6 by the suction pump 9 is introduced into a groove 4, and is passed through the groove 4 to spread out of the vicinity of the center of the master 1 to the outer circumference, passing through a gap between the master 1 and the slave disk 11 to come out into the air. By this airflow, fine dust stuck on the surfaces of the master 1 and the slave disk 11 is discharged into the air. When the suction pump 9 is stopped, and the inlet valve 10 is closed, while the slave disk 11 is mounted on the master 1 and the exhaust valve 8 is opened, and then the exhaust pump is operated to discharge air in the groove 4, the master 1 and the slave disk 11 is closely stuck to each other.



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[Translation of address omitted]

Title of the Invention : MAGNETIC TRANSFER DEVICE

Translation of Column 4, line 41 – Column 5, line 47

【0024】

The following will describe an embodiment of the present invention while referring to drawings.

(First Embodiment)

A magnetic transfer device according to the first embodiment of the present invention will be described below, with reference to FIGS. 1 to 4. FIG. 1 shows a transfer surface of a master of the magnetic transfer device and a cross section of the same, and FIGS. 2 to 4 are cross-sectional views of the magnetic transfer device for illustrating an operation of the magnetic transfer device.

【0025】

In these views, 1 denotes a master, 2 denotes a transfer region, 3 denotes a spindle for centering the disk, 4 denotes grooves extending radially from the center of the master, 5 denotes a vent hole extending from the inside of the groove 4 to the other surface of the master, 6 denotes a chamber that connects the plurality of vent holes 5 with each other, 7 denotes an exhaust pump that exhausts air inside the chamber 6, 8 denotes an exhaust valve that controls the exhaustion of air, 9 denotes a suction pump that absorbs air into the chamber 6, and 10 denotes an inlet valve that controls the absorption of air. 11 is a slave disk in which information is recorded by magnetic transfer, and 12 denotes a center hole that regulates the center position of the slave disk 11 when the slave disk 11 is loaded in the magnetic transfer device.

【0026】

The operation of the magnetic transfer device is classified roughly into three stages, which are described below. First of all, the first stage is described with reference to FIG. 2. The slave disk 11 is placed so that the spindle 3 of the master 1 is inserted into the center hole 12. The position of the slave disk 11 is regulated once so that a surface of the slave disk 11 and a surface of the master 1 are out of contact with each other, having a gap allowing air to pass through is provided between a surface of the slave disk 11 and a surface of the master 1. In this state, the exhaust valve 8 is closed once, while the inlet valve 10 is opened, in which state the suction pump 9 is activated.

【0027】

As shown in FIG. 1, the master 1 is provided with vent holes 5 in the vicinity of the center thereof. Air fed under pressure into the chamber 6 by the suction pump 9 passes through the vent holes 5 and are brought into the grooves 4. The air brought into the grooves 4 passes the grooves 4, thereby spreading out of the vicinity of the center to the outer circumference. Further, the air goes from the grooves 4 through the gap between the master 1 and the slave disk 11 thereby coming out into the atmosphere.

【0028】

This airflow causes fine dust stuck on the surfaces of the master 1 and the slave disk 11 to be exhausted with air to the atmosphere.

【0029】

Next, the second stage is described with reference to FIG. 3. The suction pump 9 is stopped, and the inlet valve 10 is closed. Then, the slave disk 11 is placed on the master 1. Thereafter, the exhaust valve 8 is opened, and the exhaust pump 7 is activated. The air in the grooves 4 is exhausted, and a pressure in a space of grooves 4 closed by the slave disk 11 decreases to be lower than the atmospheric pressure. Therefore, the slave disk 11 is pressed against to the master 1 by the atmospheric pressure 13.

【0030】

As a result, a transfer region of the master 1 is brought into close contact with the slave disk 11. In this state, a magnetic field necessary for transfer is applied.

【0031】

Finally, the third stage is described with reference to FIG. 4. After

the transfer, the exhaust pump 7 is stopped, and the exhaust valve 8 is closed. Then, the suction valve 10 is opened, and the suction pump 9 is activated. The air fed under pressure to the chamber 6 by the suction pump 9 is passed through the vent holes 5, thereby being brought into the grooves 4. The pressure in the space inside the grooves 4 closed by the slave disk 11 increases to be greater than the atmospheric pressure. As a result, the air pressure 14 is exerted to the slave disk 11, thereby separating the slave disk 11 from the master 1.

FIG. 1

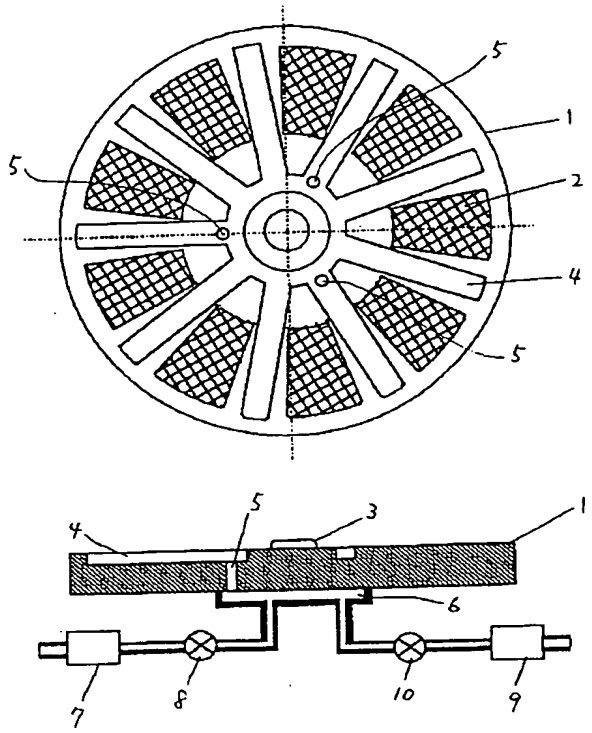


FIG. 2

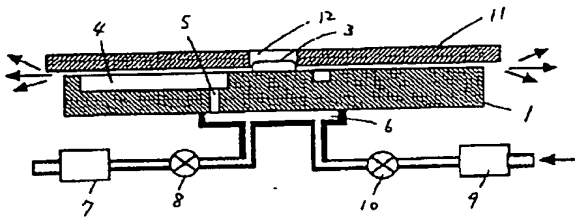


FIG. 3.

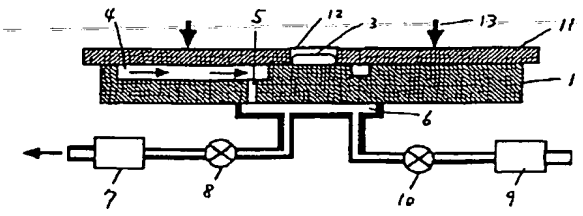
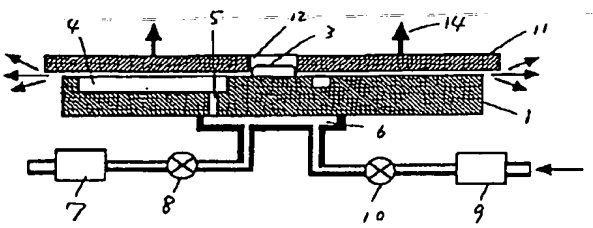


FIG. 4



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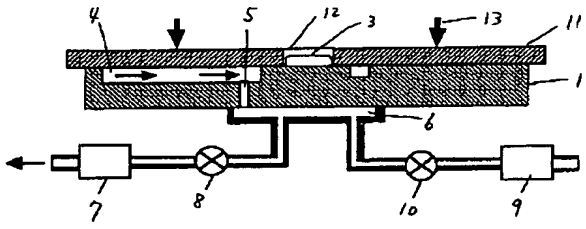
(54)【発明の名称】　磁気転写装置

(57)【要約】

【課題】　マスタとスレーブディスクを重ね合わせ、マスタに記録された情報をスレーブディスクに磁気的に転写する磁気転写装置において、マスタとスレーブディスクの密着性を高めること。

【解決手段】　マスタ１の磁気転写面にその中心部位置から外周に向けて放射状に広がる溝４を設け、吸気弁１０を閉じ、排気弁８を開き、排気ポンプ７を作動させることにより、溝４の空気を排出することによりマスタとスレーブディスク１１がその内周から外周にわたって密着できることを容易ならしめるという作用を有する。



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【特許請求の範囲】

【請求項１】マスタの磁気転写面にスレーブディスクの中心部位置から放射状に広がる複数の凹部を設けたことを特徴とする磁気転写装置。

【請求項２】凹部がマスタの磁気転写面に彫られた溝であることを特徴とする請求項１記載の磁気転写装置。

【請求項３】凹部がマスタの磁気転写面にあけられた孔であることを特徴とする請求項１記載の磁気転写装置。

【請求項４】マスタにスレーブディスクを近接させ、凹部に気体を圧送してマスタとスレーブディスクの隙間に気体の流れを発生させた後、前記凹部の気体を排出して大気圧より低い状態に保つことにより前記スレーブディスクを前記マスタに吸着し、転写磁界を印加することを特徴とする請求項１記載の磁気転写装置。

【請求項５】凹部の気体を排出して大気圧より低い状態に保つことによりスレーブディスクをマスタに吸着し、転写磁界を印加した後、凹部に気体を圧送することにより前記マスタから前記スレーブディスクを剥離することを特徴とする請求項１記載の磁気転写装置。

【請求項６】スレーブディスクの基準位置に対して凹部の位置が異なる複数のマスタを用いて複数回磁気転写を行うことを特徴とする請求項１記載の磁気転写装置。

【請求項７】一つのマスタに対してスレーブディスクの基準位置を変えて複数回磁気転写を行うことを特徴とする請求項１記載の磁気転写装置。

【請求項８】凹部に気体を圧送し、スレーブディスクをマスタから浮上させながらスレーブディスクを回転させ、１つのマスタに対してスレーブディスクの基準位置を変えて複数回磁気転写することを特徴とする請求項７記載の磁気転写装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、ハードディスク装置やフロッピーディスク装置に用いられる磁気ディスク媒体をスレーブディスクとして、情報信号を備えたマスタの情報をスレーブディスクに転写する磁気転写装置に関する。

【０００２】

【従来の技術】現在、代表的な磁気ディスク装置であるハードディスクドライブは、すでに面記録密度が１Ｇｂｉｔ／ｓｑｉｎを越える物が商品化され、数年後には１０Ｇｂｉｔ／ｓｑｉｎの実用化が議論されるほどの急激な技術進歩が認められる。

【０００３】このような高記録密度を可能とした技術的背景には、線記録密度の向上もさることながら、わずか数μｍのトラック幅の信号をＳＮ良く再生できる磁気抵抗素子型ヘッドに依るところが大である。

【０００４】さて、ヘッドがこのような狭トラックを正確に走査するためにはヘッドのトラッキングサーボ技術が重要な役割を果たしている。このようなトラッキングサーボ技術に関しては、例えば、”山口：磁気ディスク装置の高精度サーボ技術、日本応用磁気学会誌、Ｖｏｌ．２０、ＮＯ．３、ｐｐ．７７１（１９９６）”に詳細な内容が示されている。上記文献によれば、現在のハードディスクドライブでは、ディスクの１周中、一定の角度間隔でトラッキング用のサーボ信号やアドレス情報信号、再生クロック信号等が記録されている。ドライブ装置は、ヘッドから一定時間間隔で再生されるこれらの信号によりヘッドの位置を検出、修正して、ヘッドが正確にトラック上を走査することを可能にしている。

【０００５】上述した、サーボ信号やアドレス情報信号、再生クロック信号等はヘッドが正確にトラック上を走査するための基準信号となるものであるから、その書き込み（以下、フォーマティングと記す）には高い位置決め精度が必要である。現在のハードディスクドライブでは、光干渉を利用した高精度位置検出装置を組み込んだ専用のサーボ装置（以下サーボライタ）を用いて記録ヘッドを位置決めしてフォーマティングが行われている。

【０００６】しかしながら、上記サーボライタによるフォーマティングは以下の課題が存在する。

【０００７】まず第１の課題として、ヘッドを高精度に位置決めしながら多数のトラックにわたって信号を書き込むには多くの時間がかかる。生産性を上げるには多くのサーボライタを同時に稼働させなければならない。そこで第２の課題として、多くのサーボライタの導入、維持管理に多額のコストがかかる。これらの課題はトラック密度が向上しトラック数が多くなるほど深刻である。

【０００８】そこで、フォーマティングをサーボライタではなく、予め全てのサーボ情報が書き込まれたマスタと呼ばれるディスクとフォーマティングすべき磁気ディスクを重ね合わせ外部から転写用のエネルギーを与えることによりマスタの情報を磁気ディスクに一括転写する方式が提案されている。この方式の重要な課題は、マスタとスレーブディスクとをいかに隙間なく密着させるかである。

【０００９】この課題を解決する方法は、マスタとスレーブディスクの表面粗さやうねりを可能な限り小さくするとともに、マスタとスレーブディスクの間の空気を排出することである。

【００１０】図１１は特公平１－８８９２１号公報に示された磁気転写装置である。以下の説明で用いる符号は同公報に記述のものとは異なる符号を付している。同公報において、スレーブ媒体３３を同径の円盤状のマスタ媒体３２の上に置き、その上に同様なマスタ媒体３１をのせる。これらの媒体３１～３３を圧着リング４１、４２によって外周規制部材３４に圧着固定する。マスタ媒体３１、３２とスレーブ媒体３３との残留空気は外周規制部材３４の環状部３６の内側壁３６ａに設けた空気抜き孔３８から環状部３６の内側の中空部３７に逃げ、外

側壁部３９から空気吸引ダクト４０を経て排出される。次にバイアス磁界発生コイル４３、４４によって転写用バイアス磁界を媒体３１～３３にくわえることにより、マスタ媒体３１、３２に記録された情報をスレーブ媒体３３の両面に記録する。

【００１１】

【発明が解決しようとする課題】しかしながら、上記同公報の磁気転写装置においては、マスタとスレーブディスクとの間の空気を排出するのがディスクの外周端のみであり、もし、外周端で先にマスタとスレーブディスクが密着してしまうと、内周部の空気を排出できず、内周部が密着しないという問題がある。

【００１２】さらに、マスタとスレーブディスクの表面粗さが小さい場合、互いに密着してしまうと今度は引き離すのが困難になるという問題がある。

【００１３】また、スレーブディスクを多数枚転写するとスレーブディスクに付着している微細なゴミ等がマスタに堆積して、マスタとスレーブディスクの密着を妨げるようになるという問題もある。

【００１４】

【課題を解決するための手段】この課題を解決するために本発明は、マスタの磁気転写面にスレーブディスクの中心部位置から放射状に広がる複数の凹部を設けている。そして、マスタにスレーブディスクを近接させ、凹部に気体を圧送してマスタとスレーブディスクの隙間に気体の流れを発生させることによりスレーブディスクやマスタに付着している微細なゴミを吹き流す。

【００１５】次にマスタの磁気転写面に設けられたスレーブディスクの中心部位置から放射状に広がる複数の凹部の気体を排出して大気圧より低い状態に保つことにより、前記スレーブディスクをその内周から外周にわたって前記マスタに吸着させ、転写磁界を印加する。転写が終了すると、凹部に気体を圧送することにより前記マスタから前記スレーブディスクを容易に剥離することができる。

【００１６】

【発明の実施の形態】本発明の請求項１に記載の発明は、マスタの磁気転写面にスレーブディスクの中心部位置から外周に向けて放射状に広がる複数の凹部を設けたことを特徴とする磁気転写装置であり、凹部の空気を排出することによりマスタとスレーブディスクがその内周から外周にわたって全面的に密着できることを容易ならしめるという作用を有する。

【００１７】本発明の請求項２に記載の発明は、前記凹部がマスタの磁気転写面に彫られた溝であり、細い凹部でも比較的容易に作成する事ができるという特徴がある。

【００１８】本発明の請求項３に記載の発明は、前記凹部がマスタの磁気転写面にあけられた穴であり、前記凹部の効果的な場所に配置することが比較的容易にできるという特徴がある。

【００１９】本発明の請求項４に記載の発明は、マスタにスレーブディスクを近接させ、凹部に気体を圧送してマスタとスレーブディスクの隙間に気体の流れを発生させた後、前記凹部の気体を排出して大気圧より低い状態に保つことにより前記スレーブディスクを前記マスタに吸着し、転写磁界を印加することを特徴とする請求項１記載の磁気転写装置であり、転写を行う前に気体の流れによりマスタやスレーブディスクに付着したゴミを吹き流すという作用を有する。

【００２０】本発明の請求項５に記載の発明は、凹部の気体を排出して大気圧より低い状態に保つことによりスレーブディスクをマスタに吸着し、転写磁界を印加した後、凹部に気体を圧送することにより前記マスタから前記スレーブディスクを剥離することを特徴とする請求項１記載の磁気転写装置であり、転写終了後、マスタとスレーブディスクが容易に分離できるという作用を有する。

【００２１】本発明の請求項６に記載の発明は、スレーブディスクの基準位置に対して凹部の位置が異なる複数のマスタを用いて複数回磁気転写を行うことを特徴とする請求項１記載の磁気転写装置であり、１回の転写では凹部による転写不可能な領域があっても複数のマスタを用いて複数回転写することによりスレーブディスクの全面にわたって転写が可能になる。

【００２２】本発明の請求項７に記載の発明は、一つのマスタに対してスレーブディスクの基準位置を変えて複数回磁気転写を行うことを特徴とする請求項１記載の磁気転写装置であり、こうすることにより、転写される磁気パターンが一定のパターンの繰り返しでよい場合は、１つのマスタでもスレーブディスクの全面に転写が可能になる。

【００２３】本発明の請求項８に記載の発明は、凹部に気体を圧送し、スレーブディスクをマスタから浮上させながらスレーブディスクを回転させ、１つのマスタに対してスレーブディスクの基準位置を変えて複数回磁気転写することを特徴とする請求項７記載の磁気転写装置であり、スレーブディスクを回転させる際にマスタとスレーブディスクの記録面が非接触となり、スレーブディスクの記録面が傷つく恐れがない。

【００２４】以下本発明の実施形態について、図面を参照しながら説明する。

（実施の形態１）図１ないし図４を用いて本発明の実施の形態１に係わる磁気転写装置について説明する。図１は同磁気転写装置のマスタの転写面ならびに断面図を示し、図２ないし図４は同磁気転写装置の断面図により同磁気転写装置の動作を説明するものである。

【００２５】これらの図において、１はマスタであり、２は転写領域、３はディスクをセンタリングするスピンドル、４はマスタの中心から放射状に広がった溝、５は

溝４内部とマスタの他方の面とを貫通する通気孔、６は複数の通気孔を連結するチャンバー、７はチャンバー６内の空気を排気する排気ポンプ、８は空気の排出を制御する排気弁、９はチャンバー６内に空気を吸気する吸気ポンプ、１０は空気の吸気を制御する吸気弁である。１１は、磁気転写により情報が記録されるスレーブディスクであり、１２はスレーブディスク１１を磁気転写装置に装着する際にスレーブディスクの１１の中心位置を規制するためのセンターホールである。

【００２６】この磁気転写装置の動作は大きく３段階に分かれており、以下に説明する。まず、第１段階を図２を用いて説明する。スレーブディスク１１のセンターホール１２がマスタ１のスピンドル３に挿入される。そして、スレーブディスク１１は、その表面がマスタ１の表面と接触せず空気の通る隙間をもつような位置で一旦位置規制される。この状態で、排気弁８を閉じ、吸気弁１０を開けて吸気ポンプ９を動作させる。

【００２７】図１に示すようにマスタ１にはその中心近傍に通気孔５が設けられているので、吸気ポンプ９によってチャンバー６に圧送された空気は通気孔５を通り、溝４に導入される。溝４に導入された空気は溝４を通りマスタ１の中心近傍から外周へ向かって広がる。そして、さらに溝４からマスタ１とスレーブディスク１１との隙間を通って大気へとぬける。

【００２８】この空気の流れにより、マスタ１やスレーブディスク１１の表面に付着していた微細なゴミは空気と共に大気へと排出される。

【００２９】次に、第２段階を図３を用いて説明する。吸気ポンプ９を停止させ、吸気弁１０を閉じる。そして、スレーブディスク１１をマスタ１に乗せる。その後、排気弁８を開き、排気ポンプ７を作動させる。溝４内部の空気が排出され、スレーブディスク１１によって閉じられた溝４の空間の圧力は大気圧よりも低くなる。したがって、スレーブディスク１１は大気圧１３によりマスタ１に押しつけられる。

【００３０】その結果、マスタ１の転写領域とスレーブディスク１１が密着する。この状態で、転写に必要な磁界を印加する。

【００３１】最後に第３段階を図４を用いて説明する。転写が終了したら、排気ポンプ７を停止させ、排気弁８を閉じる。次に吸気弁１０を開き、吸気ポンプ９を作動させる。吸気ポンプ９によってチャンバー６に圧送された空気は通気孔５を通り、溝４に導入される。スレーブディスク１１によって閉じられた溝４内部の空間は大気圧より高くなる。その結果、スレーブディスク１１には空気圧１４が作用して、スレーブディスク１１はマスタ１から剥離される。

【００３２】以上説明したように、本実施の形態によれば、転写の直前にマスタ１やスレーブディスク１１に付着した微細なゴミが除去されるとともに、放射状に配置された溝４による吸引により、スレーブディスク１１の全面にわたってマスタ１と密着できる。さらに、密着したマスタ１とスレーブディスク１１を空気圧により無理なく剥離できる。

【００３３】その結果、転写の信頼性が極めて高い。

（実施の形態２）図５を用いて本発明の実施の形態２に係わる磁気転写装置について説明する。

【００３４】図５は同磁気転写装置のマスタ１の転写面と断面を説明する図である。同磁気転写装置のマスタ１には、放射状に並んだ複数の孔１５が設けられている。孔１５はチャンバー６に通じている。すなわち、実施の形態１において、スレーブディスク１１を吸引したり、空気圧で剥離したりするための溝４のかわりに複数の孔１５を設けており、その作用は溝４と同じである。本実施の形態における磁気転写装置の動作は、実施の形態１と全く同じであるので説明は省略する。

【００３５】本実施の形態では、孔は溝に比較してその配置が自由であるので、配置を最適化してスレーブディスク１１の吸引時の変形を少なくし、より密着性を高めることが可能であるという効果を有する。

【００３６】（実施の形態３）図６ないし図９を用いて実施の形態３に係わる磁気転写装置について説明する。

【００３７】同磁気転写装置においては、図６に示すように、センターホール１２にキー溝１６を設けたスレーブディスク１１を用いる。また、図７に示すように、マスタＡ１７とマスタＢ１８には、そのスピンドル３に位置決めキー１９が設けられている。スレーブディスク１１のキー溝１６は、位置決めキー１９にはまり合うので、スレーブディスク１１は位置決めキー１９の方向により一定の角度位相でマスタＡ１７及びマスタＢ１８に装着される。マスタＡ１７の位置決めキー１９の向きは溝４の９つの腕の方向に一致している。一方、マスタＢ１８の位置決めキー１９の向きは溝４の腕と腕の間を向いている。

【００３８】次に図８および図９を用いて同磁気転写装置の動作を説明する。始めに、マスタＡ１７を用いて第１の転写を行う。このとき、スレーブディスク１１のキー溝１６にマスタＡ１７の位置決めキー１９がはまり合うので、スレーブディスク１１にはキー溝１６の位置に対して図８の転写パターンＡに示すような決まった角度位置に転写が行われる。転写を行う過程は実施の形態１と同じであるので省略する。

【００３９】次に、そのスレーブディスク１１に対してマスタＢ１８を用いて転写する。第１の転写と同様に、スレーブディスク１１のキー溝１６にマスタＢ１８の位置決めキー１９がはまり合うので、スレーブディスク１１にはキー溝１６の位置に対して図９の転写パターンＢに示すような決まった角度位置に転写が行われる。その結果、図９に示すように、転写パターンＡ２０の間に転写パターンＢ２１が形成される。

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【００４０】以上説明したように、本実施の形態の磁気転写装置を用いれば、スレーブディスク１１のほぼ全円周にわたって転写パターンを得ることが可能になる。

【００４１】（実施の形態４）図１０、ならびに図６、図８、図９を用いて本発明の実施の形態４に係わる磁気転写装置について説明する。同磁気転写装置では、図６に示すように、センターホール１２にキー溝１６を設けたスレーブディスク１１を用いる。図１０は同磁気転写装置の断面図である。スピンドル３には位置決めキー１９が設けられ、またスピンドルモータ２２によって回転駆動される。

【００４２】まず、第１の転写を行うためにスレーブディスク１１を、そのキー溝がスピンドル３の位置決めキー１９にはまり合うように装着する。第１の転写の過程は実施の形態１で説明した過程と同じであるので省略する。第１の転写が終了した時点でのスレーブディスク１１の転写パターンは、図８に示すようにマスタ１の溝４に相当する部分は転写されていない。第１の転写が終了すると、排気弁８が閉じられ、吸気弁１０が開放されて吸気ポンプ９が作動する。溝４に導入された空気圧によりスレーブディスク１１はマスタ１から剥離され、さらに空気圧によりマスタ１から浮上する。

【００４３】この状態を維持しながら、スピンドルモータ２２を駆動してスピンドルを回転させる。スレーブディスク１１は位置決めキー１９によって回転駆動される。スレーブディスク１１が所定の角度、回転駆動されると、スピンドルモータ２２および吸気ポンプ９は停止される。そして、吸気弁１０が閉じられ、第１の転写と同じように第２の転写が行われる。第２の転写が終了した時点でのスレーブディスク１１の転写パターンは図９のようになる。ただし、本実施の形態では第１の転写で得られる転写パターンＡ２０と第２の転写で得られる転写パターンＢは必ず同一のものとなることは言うまでもない。

【００４４】以上説明したように、本実施の形態の磁気転写装置を用いれば、スレーブディスク１１のほぼ全円周にわたって繰り返しの転写パターンを得ることが可能になる。また、スレーブディスク１１を空気圧で浮上させながら回転させるので、スレーブディスク１１が回転中に傷つくおそれが全くない。

【００４５】

【発明の効果】以上のように本発明は、マスタに気体を導入する溝や孔を設けることにより、マスタやスレーブディスクの清掃、マスタとスレーブディスクの良好な密着の実現、スレーブディスクを傷つけることなくマスタから剥離できる、という効果が得られ、転写の信頼性が非常に高い。

【図面の簡単な説明】

【図１】本発明の実施の形態１による磁気転写装置の構成を説明する図

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【図２】同動作を説明する断面図

【図３】同動作を説明する断面図

【図４】同動作を説明する断面図

【図５】本発明の実施の形態２による磁気転写装置の構成を説明する図

【図６】本発明の実施の形態３による磁気転写装置に使用するスレーブディスクを説明する図

【図７】本発明の実施の形態３による磁気転写装置の構成を説明する図

【図８】同動作を説明する図

【図９】同動作を説明する図

【図１０】本発明の実施の形態４による磁気転写装置の構成と動作を説明する断面図

【図１１】従来の磁気転写装置の構成と動作を説明する断面図

【符号の説明】

１　マスタ
２　転写領域
３　スピンドル
４　溝
５　通気孔
６　チャンバー
７　排気ポンプ
８　排気弁
９　吸気ポンプ
１０　吸気弁
１１　スレーブディスク
１２　センターホール
１３　大気圧
１４　空気圧
１５　孔
１６　キー溝
１７　マスタＡ
１８　マスタＢ
１９　位置決めキー
２０　転写パターンＡ
２１　転写パターンＢ
２２　スピンドルモータ
３１　マスタ媒体
３２　マスタ媒体
３３　スレーブ媒体
３４　外周規制部材
３５　通気孔
３６　環状部
３６ａ　内側壁
３７　中空部
３８　空気抜き孔
３９　外側壁部
４０　空気吸引ダクト
４１　圧着リング

9　　10

４２　圧着リング

４３　磁界発生コイル

＊４４　磁界発生コイル

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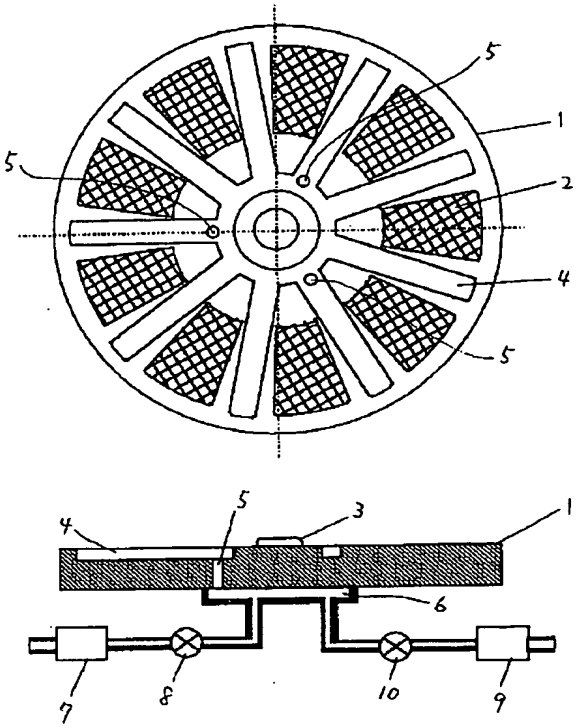
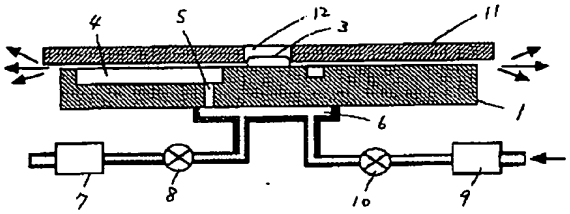
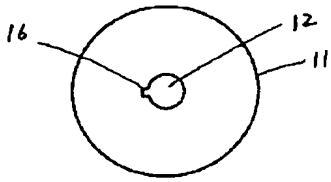
【図１】



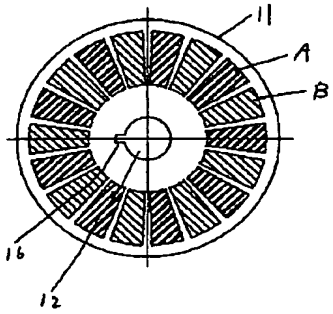
【図２】



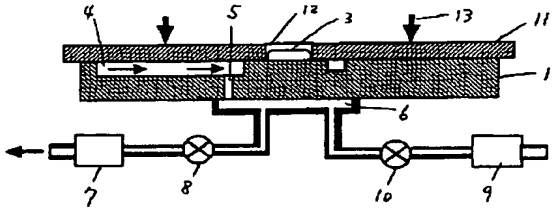
【図６】



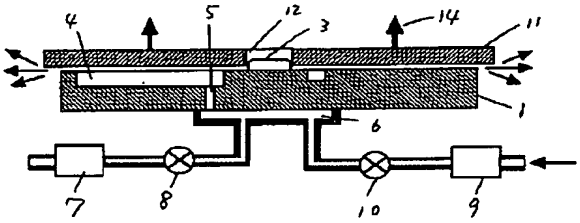
【図９】



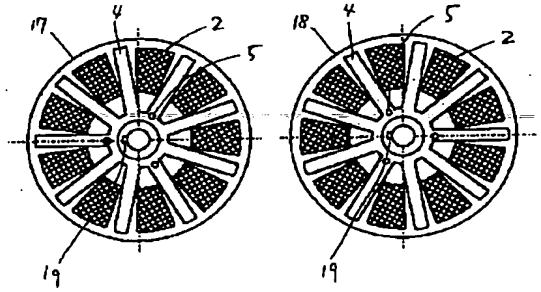
【図３】



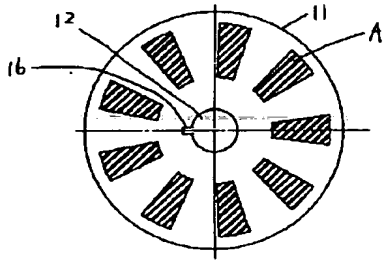
【図４】



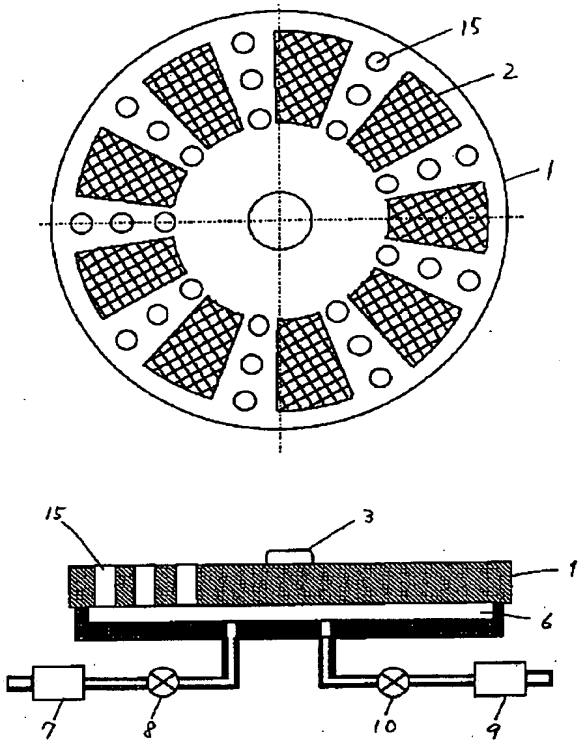
【図７】



【図８】



【図５】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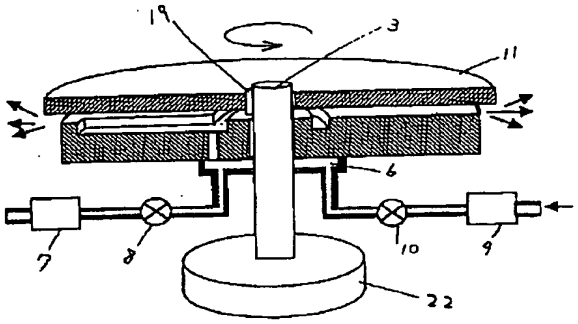
【図１０】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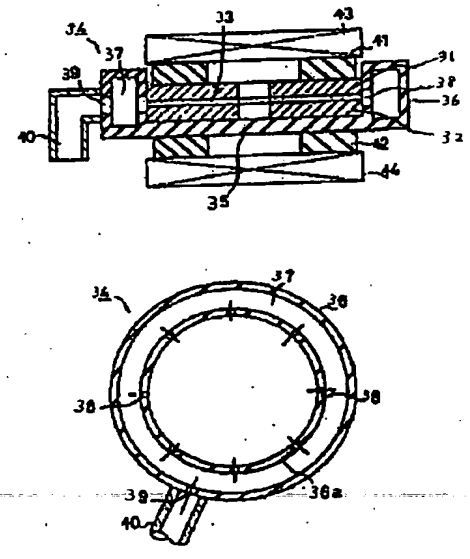
【図１１】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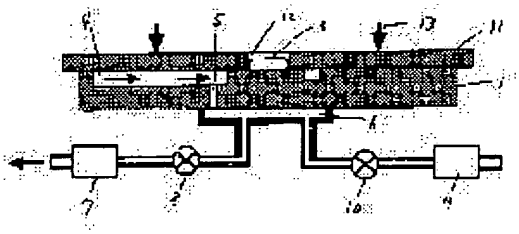
(72)Inventor : HAMADA TAIZO
MITSUNABE SATORU

(54) MAGNETIC TRANSFER DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To make a master and a slave disk extensively closely stuck to each other from the inner circumference over to the outer circumference, by providing plural recessed parts extending radially from a central position of the slave disk in the magnetic transfer surface of the master.

SOLUTION: A spindle 3 of the master 1 is inserted into a center hole 12 of the slave disk 11, and an exhaust valve 8 is closed and an inlet valve is opened to operate a suction pump 9. Air fed under pressure into a chamber 6 by the suction pump 9 is introduced into a groove 4, and is passed through the groove 4 to spread out of the vicinity of the center of the master 1 to the outer circumference, passing through a gap between the master 1 and the slave disk 11 to come out into the air. By this airflow, fine dust stuck on the surfaces of the master 1 and the slave disk 11 is discharged into the air. When the suction pump 9 is stopped, and the inlet valve 10 is closed, while the slave disk 11 is mounted on the master 1 and the exhaust valve 8 is opened, and then the exhaust pump is operated to discharge air in the groove 4, the master 1 and the slave disk 11 is closely stuck to each other.



LEGAL STATUS

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[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

JP 11-025455

* NOTICES *

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Magnetic-transfer equipment characterized by establishing two or more crevices which spread in a radial from the core position of a slave disk in the magnetic-transfer side of a master.
[Claim 2] Magnetic-transfer equipment according to claim 1 characterized by a crevice being the slot with which the magnetic-transfer side of a master was engraved.
[Claim 3] Magnetic-transfer equipment according to claim 1 characterized by being the hole with which the crevice was opened in the magnetic-transfer side of a master.
[Claim 4] Magnetic-transfer equipment according to claim 1 characterized by adsorbing the aforementioned slave disk at the aforementioned master, and impressing an imprint magnetic field by discharging the gas of the aforementioned crevice and maintaining at a low state from atmospheric pressure after making a slave disk approach a master, feeding a gas to a crevice and making the crevice between a master and a slave disk generate a gaseous flow.
[Claim 5] Magnetic-transfer equipment according to claim 1 characterized by exfoliating the aforementioned slave disk from the aforementioned master by feeding a gas to a crevice after adsorbing a slave disk at a master and impressing an imprint magnetic field by discharging the gas of a crevice and maintaining at a state lower than atmospheric pressure.
[Claim 6] Magnetic-transfer equipment according to claim 1 characterized by performing multiple-times magnetic transfer using two or more masters from which the position of a crevice differs to the criteria position of a slave disk.
[Claim 7] Magnetic-transfer equipment according to claim 1 characterized by changing the criteria position of a slave disk to one master, and performing multiple-times magnetic transfer.
[Claim 8] Magnetic-transfer equipment according to claim 7 characterized by feeding a gas to a crevice, rotating a slave disk, surfacing a slave disk from a master, and changing and carrying out multiple-times magnetic transfer of the criteria position of a slave disk to one master.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the magnetic-transfer equipment which imprints the information on the master equipped with the information signal on a slave disk by using as a slave disk the magnetic-disk medium used for a hard disk drive unit or a floppy disk drive unit.
[0002]
[Description of the Prior Art] Now, the object with which field recording density already exceeds 1 Gbit/sqin is commercialized, and, several years after, as for the hard disk drive which is a typical magnetic disk unit, technical progress rapid like it argues about utilization of 10 Gbit/sqin will be accepted.
[0003] The place which depends on the magnetic-resistance-element type head on which improvement in track recording density can also reproduce the signal of the several [only] micrometers width of recording track with sufficient SN with last thing at the technical background which made such high recording density possible is size.
[0004] Now, in order for a head to scan such a ** truck correctly, the role with the important tracking-servo technology of a head is played. the detailed content is shown in "the high precision servo technology of the Yamaguchi:magnetic disk unit, the Magnetics Society of Japan, Vol.20, NO.3, pp.771 (1996)", concerning such tracking-servo technology According to the above-mentioned reference, the servo signal for tracking, an address information signal, a reproduction clock signal, etc. are recorded at the fixed angle interval among 1 round of a disk at the present hard disk drive. The head is enabled for drive equipment to detect and correct the position of a head with these signals reproduced by the fixed time interval from a head, and to scan a truck top correctly.
[0005] Since the servo signal and address information signal which were mentioned above, a reproduction clock signal, etc. turn into a reference signal for a head scanning a truck top correctly, the positioning accuracy high for writing in (it being hereafter described as former TINGU) is required for them. In the present hard disk drive, a recording head is positioned using the servo system (following servo writer) of exclusive use incorporating the high precision position detection equipment using an optical interference, and former TINGU is performed.
[0006] However, the technical problem of the following [TINGU / former / by the above-mentioned servo writer] exists.
[0007] Writing in a signal over many trucks takes much time as the 1st technical problem first, positioning a head with high precision. You have to work many servo writers simultaneously to raise productivity. Then, as 2nd technical problem, a large amount of cost starts introduction of many servo writers, and a maintenance. They are so serious that track density of these technical problems improves and its number of trucks increases.
[0008] Then, the method which carries out the package imprint of the information on a master at a magnetic disk is proposed by piling up the magnetic disk which should carry out former TINGU of

former TINGU not with a servo writer but with the disk called master in which all servo information was written beforehand, and giving the energy for an imprint from the exterior. The important technical problem of this method is how to stick a master and a slave disk without a crevice.
[0009] The method of solving this technical problem is discharging the air between a master and a slave disk while making the surface roughness and the wave of a master and a slave disk as small as possible.
[0010] Drawing 11 is magnetic-transfer equipment shown in JP,1-88921,B. The sign used by the following explanation gives a different sign from the thing of description to this official report. In this official report, the slave medium 33 is placed on the master medium 32 of the shape of a disk of the diameter of said, and the master medium 31 same on it is carried. Sticking-by-pressure fixation of these media 31-33 is carried out with the sticking-by-pressure rings 41 and 42 at the periphery specification-part material 34. the air vent which prepared the remains air of the master media 31 and 32 and the slave medium 33 in paries-medialis-orbitae 36a of the annular section 36 of the periphery specification-part material 34 -- escape from a hole 38 to the centrum 37 inside the annular section 36, and pass the air suction duct 40 from the paries-lateralis-orbitae section 39 -- it is discharged Next, the information recorded on the master media 31 and 32 is recorded on both sides of the slave medium 33 by adding the bias magnetic field for an imprint to media 31-33 with the bias magnetic field generating coils 43 and 44.
[0011]
[Problem(s) to be Solved by the Invention] However, in the magnetic-transfer equipment of this above-mentioned official report, only the periphery edge of a disk discharges the air between a master and a slave disk, when a master and a slave disk stick previously at a periphery edge, the air of the inner circumference section cannot be discharged but there is a problem that the inner circumference section does not stick.
[0012] Furthermore, when the surface roughness of a master and a slave disk is small, and it sticks mutually, there is a problem that it becomes difficult to pull away shortly.
[0013] Moreover, when several slave many disks are imprinted, the detailed dust adhering to the slave disk etc. accumulates on a master, and the problem of coming to bar adhesion of a master and a slave disk also has it.
[0014]
[Means for Solving the Problem] In order to solve this technical problem, this invention has established two or more crevices which spread in a radial from the core position of a slave disk in the magnetic-transfer side of a master. And a slave disk is made to approach a master and the detailed dust adhering to the slave disk or the master is blown by feeding a gas to a crevice and making the crevice between a master and a slave disk generate a gaseous flow.
[0015] Next, by discharging the gas of two or more crevices which spread in a radial from the core position of a slave disk established in the magnetic-transfer side of a master, and maintaining at a low state from atmospheric pressure, the aforementioned slave disk is made to stick to the aforementioned master ranging from the inner circumference to a periphery, and an imprint magnetic field is impressed. After an imprint is completed, the aforementioned slave disk can be easily exfoliated from the aforementioned master by feeding a gas to a crevice.
[0016]
[Embodiments of the Invention] Invention of this invention according to claim 1 is magnetic-transfer equipment characterized by establishing two or more crevices which spread in a radial towards a periphery from the core position of a slave disk in the magnetic-transfer side of a master, and has operation of closing a master and a slave disk being able to stick extensively ranging from the inner circumference to a periphery by discharging the air of a crevice, if easy.
[0017] The aforementioned crevice is the slot with which the magnetic-transfer side of a master was engraved, and invention of this invention according to claim 2 has the feature that it can create comparatively easily also in a narrow crevice.
[0018] The aforementioned crevice is the hole made in the magnetic-transfer side of a master, and invention of this invention according to claim 3 has the feature that it can perform arranging in the

effective place of the aforementioned crevice comparatively easily.
[0019] Invention of this invention according to claim 4 makes a slave disk approach a master. After feeding the gas to the crevice and making the crevice between a master and a slave disk generate a gaseous flow, The aforementioned slave disk is adsorbed at the aforementioned master by discharging the gas of the aforementioned crevice and maintaining at a state lower than atmospheric pressure. It is magnetic-transfer equipment according to claim 1 characterized by impressing an imprint magnetic field, and before imprinting, it has operation of blowing the dust which adhered to the master or the slave disk by the gaseous flow.
[0020] After invention of this invention according to claim 5 adsorbs a slave disk at a master and impresses an imprint magnetic field by discharging the gas of a crevice and maintaining at a state lower than atmospheric pressure, by feeding a gas to a crevice, it is magnetic-transfer equipment according to claim 1 characterized by exfoliating the aforementioned slave disk from the aforementioned master, and has operation that a master and a slave disk can dissociate easily, after an imprint end.
[0021] It is magnetic-transfer equipment according to claim 1 characterized by invention of this invention according to claim 6 performing multiple-times magnetic transfer using two or more masters from which the position of a crevice differs to the criteria position of a slave disk, and in one imprint, even if there is a field by the crevice which cannot be imprinted, an imprint becomes possible over the whole surface of a slave disk by carrying out two or more rotation copy using two or more masters.
[0022] When good at the repeat of a pattern with the magnetic fixed pattern which is magnetic-transfer equipment according to claim 1 characterized by for invention of this invention according to claim 7 changing the criteria position of a slave disk to one master, and performing multiple-times magnetic transfer, and is imprinted by carrying out like this, in at least one master, an imprint becomes possible all over a slave disk.
[0023] A slave disk is rotated feeding a gas to a crevice and surfacing a slave disk from a master, it is magnetic-transfer equipment according to claim 7 characterized by changing and carrying out multiple-times magnetic transfer of the criteria position of a slave disk to one master, in case a slave disk is rotated, the recording surface of a master and a slave disk serves as non-contact, and invention of this invention according to claim 8 does not have a possibility that the recording surface of a slave disk may get damaged.
[0024] The operation form of this invention is explained below, referring to a drawing.
(Form 1 of operation) The magnetic-transfer equipment concerning the form 1 of operation of this invention is explained using drawing 1 or drawing 4 . Drawing 1 shows a cross section to the imprint side row of the master of this magnetic-transfer equipment, and drawing 2 or drawing 4 explains operation of this magnetic-transfer equipment with the cross section of this magnetic-transfer equipment.
[0025] The spindle with which 1 is a master in these drawings, 2 carries out an imprint field and 3 carries out centering of the disk, The slot where 4 spread in the radial from the center of a master, the air hole to which 5 penetrates the slot 4 interior and the field of another side of a master, The chamber with which 6 connects two or more air holes, the exhaust air pump with which 7 exhausts the air in a chamber 6, the exhaust valve with which 8 controls discharge of air, the inhalation-of-air pump with which 9 carries out the inhalation of air of the air into a chamber 6, and 10 are inlet valves which control the inhalation of air of air. 11 is a slave disk with which information is recorded by magnetic transfer, and in case 12 equips magnetic-transfer equipment with the slave disk 11, it is a pin center,large hole for regulating the center position of 11 of a slave disk.
[0026] Operation of this magnetic-transfer equipment is roughly divided into the three-stage, and is explained below. First, the 1st phase is explained using drawing 2 . The pin center,large hole 12 of the slave disk 11 is inserted in the spindle 3 of a master 1. And position regulation of the slave disk 11 is once carried out in a position in which the front face has the crevice along which does not contact the front face of a master 1 but air passes. In this state, an exhaust valve 8 is closed, an inlet valve 10 is opened, and the inhalation-of-air pump 9 is operated.
[0027] Since the air hole 5 is formed in the master 1 near [the] the center as shown in drawing 1 , with

the inhalation-of-air pump 9, the air fed by the chamber 6 passes along an air hole 5, and is introduced into a slot 4. The air introduced into the slot 4 spreads toward a periphery through a slot 4 near the center of a master 1. And it escapes from a slot 4 to the atmosphere through the crevice between a master 1 and the slave disk 11 further.
[0028] The detailed dust adhering to the front face of a master 1 or the slave disk 11 is discharged with air by the flow of this air to the atmosphere.
[0029] Next, the 2nd phase is explained using drawing 3 . The inhalation-of-air pump 9 is stopped and an inlet valve 10 is closed. And the slave disk 11 is put on a master 1. Then, an exhaust valve 8 is opened and the exhaust air pump 7 is operated. The air of the slot 4 interior is discharged and the pressure of the space of the slot 4 closed with the slave disk 11 becomes lower than atmospheric pressure. therefore, the slave disk 11 -- atmospheric pressure 13 -- a master 1 -- forcing **
[0030] Consequently, the imprint field and the slave disk 11 of a master 1 stick. A magnetic field required for an imprint is impressed in this state.
[0031] Finally, drawing 4 is used and the 3rd phase is explained. If an imprint is completed, the exhaust air pump 7 will be stopped and an exhaust valve 8 will be closed. Next, an inlet valve 10 is opened and the inhalation-of-air pump 9 is operated. With the inhalation-of-air pump 9, the air fed by the chamber 6 passes along an air hole 5, and is introduced into a slot 4. The space of the slot 4 interior closed with the slave disk 11 becomes higher than atmospheric pressure. Consequently, pneumatic pressure 14 acts on the slave disk 11, and the slave disk 11 exfoliates from a master 1.
[0032] As explained above, while the detailed dust which adhered to the master 1 or the slave disk 11 just before the imprint is removed according to the form of this operation, it can stick with a master 1 over the whole surface of the slave disk 11 by suction by the slot 4 arranged at the radial. Furthermore, the master 1 and the slave disk 11 which were stuck can be exfoliated reasonable by pneumatic pressure.

[0033] Consequently, the reliability of an imprint is very high.
(Gestalt 2 of operation) The magnetic-transfer equipment concerning the gestalt 2 of operation of this invention is explained using drawing 5 .
[0034] Drawing 5 is drawing explaining the imprint side and cross section of a master 1 of this magnetic-transfer equipment. Two or more holes 15 located in a line with the radial are formed in the master 1 of this magnetic-transfer equipment. The hole 15 leads to the chamber 6. That is, in the gestalt 1 of operation, two or more holes 15 are formed instead of the slot 4 for attracting the slave disk 11 or exfoliating in pneumatic pressure, and the operation is the same as a slot 4. Since operation of the magnetic-transfer equipment in the gestalt of this operation is completely the same as the gestalt 1 of operation, explanation is omitted.
[0035] With the gestalt of this operation, since the arrangement of a hole is free as compared with a slot, arrangement is optimized, deformation at the time of suction of the slave disk 11 is lessened, and it has the effect that it is possible to raise adhesion more.
[0036] (Gestalt 3 of operation) The magnetic-transfer equipment concerning the gestalt 3 of operation is explained using drawing 6 or drawing 9 .
[0037] In this magnetic-transfer equipment, as shown in drawing 6 , the slave disk 11 which formed the key seat 16 in the pin center,large hole 12 is used. Moreover, as shown in drawing 7 , the locator key 19 is formed in the spindle 3 at the master A17 and the master B18. Since the key seat 16 of the slave disk 11 fits each other into a locator key 19, a master A17 and a master B18 are equipped with the slave disk 11 with a fixed angle phase by the direction of a locator key 19. The sense of the locator key 19 of a master A17 is in agreement in the direction of nine arms of a slot 4. On the other hand, the sense of the locator key 19 of a master B18 has turned to between the arm of a slot 4, and arms.
[0038] Next, operation of this magnetic-transfer equipment is explained using drawing 8 and drawing 9 . The 1st imprint is performed using introduction and a master A17. Since the locator key 19 of a master A17 fits each other into the key seat 16 of the slave disk 11 at this time, an imprint is performed to the regular angular position as shown in the imprint pattern A of drawing 8 to the position of a key seat 16 at the slave disk 11. Since it is the same as the form 1 of operation, the process which imprints is

skipped.
[0039] Next, it imprints using a master B18 to the slave disk 11. Like the 1st imprint, since the locator key 19 of a master B18 fits each other into the key seat 16 of the slave disk 11, an imprint is performed to the regular angular position as shown in the imprint pattern B of drawing 9 to the position of a key seat 16 at the slave disk 11. Consequently, as shown in drawing 9 , the imprint pattern B21 is formed between the imprint patterns A20.
[0040] If the magnetic-transfer equipment of the gestalt of this operation is used as explained above, the thing of the slave disk 11 mostly acquired for an imprint pattern over all peripheries will become possible.
[0041] (Gestalt 4 of operation) Drawing 6 , drawing 8 , and drawing 9 are used for drawing 10 and a row, and the magnetic-transfer equipment concerning the gestalt 4 of operation of this invention is explained. With this magnetic-transfer equipment, as shown in drawing 6 , the slave disk 11 which formed the key seat 16 in the pin center,large hole 12 is used. Drawing 10 is the cross section of this magnetic-transfer equipment. A locator key 19 is formed in a spindle 3, and a rotation drive is carried out by the spindle motor 22.
[0042] First, in order to perform the 1st imprint, it equips with the slave disk 11 so that the key seat may fit each other into the locator key 19 of a spindle 3. Since it is the same as the process explained with the gestalt 1 of operation, the process of the 1st imprint is skipped. The portion which is equivalent to the slot 4 of a master 1 as the imprint pattern of the slave disk 11 in the time of the 1st imprint being completed is shown in drawing 8 is not imprinted. After the 1st imprint is completed, an exhaust valve 8 is closed, an inlet valve 10 is opened wide, and the inhalation-of-air pump 9 operates. The slave disk 11 exfoliates from a master 1 by the pneumatic pressure introduced into the slot 4, and it rises to surface from a master 1 by pneumatic pressure further.
[0043] Maintaining this state, a spindle motor 22 is driven and a spindle is rotated. The rotation drive of the slave disk 11 is carried out by the locator key 19. an angle predetermined in the slave disk 11 -- if a rotation drive is carried out, a spindle motor 22 and the inhalation-of-air pump 9 will stop And an inlet valve 10 is closed and the 2nd imprint is performed like the 1st imprint. The imprint pattern of the slave disk 11 in the time of the 2nd imprint being completed becomes like drawing 9 . However, the imprint pattern A20 obtained by the 1st imprint with the gestalt of this operation and the imprint pattern B obtained by the 2nd imprint cannot surely be overemphasized as the same thing and the same bird clapper.
[0044] If the magnetic-transfer equipment of the gestalt of this operation is used as explained above, the thing of the slave disk 11 mostly acquired for the imprint pattern of a repeat over all peripheries will become possible. Moreover, since it is made to rotate, surfacing the slave disk 11 by pneumatic pressure, there is no possibility of getting damaged while the slave disk 11 rotates.
[0045]
[Effect of the Invention] As mentioned above, by preparing the slot and hole which introduce a gas into a master, the effect that it can exfoliate from a master, without damaging cleaning of a master or a slave disk, realization of good adhesion of a master and a slave disk, and a slave disk is acquired, and the reliability of this invention of an imprint is very high.

[Translation done.]

* NOTICES *

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the magnetic-transfer equipment which imprints the information on the master equipped with the information signal on a slave disk by using as a slave disk the magnetic-disk medium used for a hard disk drive unit or a floppy disk drive unit.

[Translation done.]

* NOTICES *

PRIOR ART

[Description of the Prior Art] Now, the object with which field recording density already exceeds 1 Gbit/sqin is commercialized, and, several years after, as for the hard disk drive which is a typical magnetic disk unit, technical progress rapid like it argues about utilization of 10 Gbit/sqin will be accepted.
[0003] The place which depends on the magnetic-resistance-element type head on which improvement in track recording density can also reproduce the signal of the several [only] micrometers width of recording track with sufficient SN with last thing at the technical background which made such high recording density possible is size.
[0004] Now, in order for a head to scan such a ** truck correctly, the role with the important tracking-servo technology of a head is played. the detailed content is shown in "the high precision servo technology of the Yamaguchi:magnetic disk unit, the Magnetics Society of Japan, Vol.20, NO.3, pp.771 (1996)", concerning such tracking-servo technology According to the above-mentioned reference, the servo signal for tracking, an address information signal, a reproduction clock signal, etc. are recorded at the fixed angle interval among 1 round of a disk at the present hard disk drive. The head is enabled for drive equipment to detect and correct the position of a head with these signals reproduced by the fixed time interval from a head, and to scan a truck top correctly.
[0005] Since the servo signal and address information signal which were mentioned above, a reproduction clock signal, etc. turn into a reference signal for a head scanning a truck top correctly, the positioning accuracy high for writing in (it being hereafter described as former TINGU) is required for them. In the present hard disk drive, a recording head is positioned using the servo system (following servo writer) of exclusive use incorporating the high precision position detection equipment using an optical interference, and former TINGU is performed.
[0006] However, the technical problem of the following [TINGU / former / by the above-mentioned servo writer] exists.
[0007] Writing in a signal over many trucks takes much time as the 1st technical problem first, positioning a head with high precision. You have to work many servo writers simultaneously to raise productivity. Then, as 2nd technical problem, a large amount of cost starts introduction of many servo writers, and a maintenance. They are so serious that track density of these technical problems improves and its number of trucks increases.
[0008] Then, the method which carries out the package imprint of the information on a master at a magnetic disk is proposed by piling up the magnetic disk which should carry out former TINGU of former TINGU not with a servo writer but with the disk called master in which all servo information was written beforehand, and giving the energy for an imprint from the exterior. The important technical problem of this method is how to stick a master and a slave disk without a crevice.
[0009] The method of solving this technical problem is discharging the air between a master and a slave disk while making the surface roughness and the wave of a master and a slave disk as small as possible.
[0010] Drawing 11 is magnetic-transfer equipment shown in JP,1-88921,B. The sign used by the following explanation gives a different sign from the thing of description to this official report. In this

official report, the slave medium 33 is placed on the master medium 32 of the shape of a disk of the diameter of said, and the master medium 31 same on it is carried. Sticking-by-pressure fixation of these media 31-33 is carried out with the sticking-by-pressure rings 41 and 42 at the periphery specification-part material 34. the air vent which prepared the remains air of the master media 31 and 32 and the slave medium 33 in inside wall 36a of the annular section 36 of the periphery specification-part material 34 -- escape from a hole 38 to the centrum 37 inside the annular section 36, and pass the air suction duct 40 from the outside wall 39 -- it is discharged Next, the information recorded on the master media 31 and 32 is recorded on both sides of the slave medium 33 by adding the bias magnetic field for an imprint to media 31-33 with the bias magnetic field generating coils 43 and 44.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, by preparing the slot and hole which introduce a gas into a master, the effect that it can exfoliate from a master, without damaging cleaning of a master or a slave disk, realization of good adhesion of a master and a slave disk, and a slave disk is acquired, and the reliability of this invention of an imprint is very high.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the magnetic-transfer equipment of this above-mentioned official report, only the periphery edge of a disk discharges the air between a master and a slave disk, when a master and a slave disk stick previously at a periphery edge, the air of the inner circumference section cannot be discharged but there is a problem that the inner circumference section does not stick.
[0012] Furthermore, when the surface roughness of a master and a slave disk is small, and it sticks mutually, there is a problem that it becomes difficult to pull away shortly.
[0013] Moreover, when several slave many disks are imprinted, the detailed dust adhering to the slave disk etc. accumulates on a master, and the problem of coming to bar adhesion of a master and a slave disk also has it.

[Translation done.]

* NOTICES *

MEANS

[Means for Solving the Problem] In order to solve this technical problem, this invention has established two or more crevices which spread in a radial from the core position of a slave disk in the magnetic-transfer side of a master. And a slave disk is made to approach a master and the detailed dust adhering to the slave disk or the master is blown by feeding a gas to a crevice and making the crevice between a master and a slave disk generate a gaseous flow.
[0015] Next, by discharging the gas of two or more crevices which spread in a radial from the core position of a slave disk established in the magnetic-transfer side of a master, and maintaining at a low state from atmospheric pressure, the aforementioned slave disk is made to stick to the aforementioned master ranging from the inner circumference to a periphery, and an imprint magnetic field is impressed. After an imprint is completed, the aforementioned slave disk can be easily exfoliated from the aforementioned master by feeding a gas to a crevice.
[0016]
[Embodiments of the Invention] Invention of this invention according to claim 1 is magnetic-transfer equipment characterized by establishing two or more crevices which spread in a radial towards a periphery from the core position of a slave disk in the magnetic-transfer side of a master, and has operation of closing a master and a slave disk being able to stick extensively ranging from the inner circumference to a periphery by discharging the air of a crevice, if easy.
[0017] The aforementioned crevice is the slot with which the magnetic-transfer side of a master was engraved, and invention of this invention according to claim 2 has the feature that it can create comparatively easily also in a narrow crevice.
[0018] The aforementioned crevice is the hole made in the magnetic-transfer side of a master, and invention of this invention according to claim 3 has the feature that it can perform arranging in the effective place of the aforementioned crevice comparatively easily.
[0019] Invention of this invention according to claim 4 makes a slave disk approach a master. After feeding the gas to the crevice and making the crevice between a master and a slave disk generate a gaseous flow, The aforementioned slave disk is adsorbed at the aforementioned master by discharging the gas of the aforementioned crevice and maintaining at a low state from atmospheric pressure. It is magnetic-transfer equipment according to claim 1 characterized by impressing an imprint magnetic field, and before imprinting, it has operation of blowing the dust which adhered to the master or the slave disk by the gaseous flow.
[0020] After invention of this invention according to claim 5 adsorbs a slave disk at a master and impresses an imprint magnetic field by discharging the gas of a crevice and maintaining at a low state from atmospheric pressure, by feeding a gas to a crevice, it is magnetic-transfer equipment according to claim 1 characterized by exfoliating the aforementioned slave disk from the aforementioned master, and has operation that a master and a slave disk can dissociate easily, after an imprint end.
[0021] It is magnetic-transfer equipment according to claim 1 characterized by invention of this invention according to claim 6 performing multiple-times magnetic transfer using two or more masters from which the position of a crevice differs to the criteria position of a slave disk, and in one imprint,

even if there is a field by the crevice which cannot be imprinted, an imprint becomes possible over the whole surface of a slave disk by carrying out two or more rotation copy using two or more masters.
[0022] When good at the repeat of a pattern with the magnetic fixed pattern which is magnetic-transfer equipment according to claim 1 characterized by for invention of this invention according to claim 7 changing the criteria position of a slave disk to one master, and performing multiple-times magnetic transfer, and is imprinted by carrying out like this, in at least one master, an imprint becomes possible all over a slave disk.
[0023] A slave disk is rotated feeding a gas to a crevice and surfacing a slave disk from a master, it is magnetic-transfer equipment according to claim 7 characterized by changing and carrying out multiple-times magnetic transfer of the criteria position of a slave disk to one master, in case a slave disk is rotated, the recording surface of a master and a slave disk serves as non-contact, and invention of this invention according to claim 8 does not have a possibility that the recording surface of a slave disk may get damaged.
[0024] The operation gestalt of this invention is explained below, referring to a drawing.
(Gestalt 1 of operation) The magnetic-transfer equipment concerning the gestalt 1 of operation of this invention is explained using drawing 1 or drawing 4 . Drawing 1 shows a cross section to the imprint side row of the master of this magnetic-transfer equipment, and drawing 2 or drawing 4 explains operation of this magnetic-transfer equipment with the cross section of this magnetic-transfer equipment.
[0025] The spindle with which 1 is a master in these drawings, 2 carries out an imprint field and 3 carries out centering of the disk, The slot where 4 spread in the radial from the center of a master, the air hole to which 5 penetrates the slot 4 interior and the field of another side of a master, The chamber with which 6 connects two or more air holes, the exhaust air pump with which 7 exhausts the air in a chamber 6, the exhaust valve with which 8 controls eccrisis of air, the inhalation-of-air pump with which 9 carries out the inhalation of air of the air into a chamber 6, and 10 are inlet valves which control the inhalation of air of air. 11 is a slave disk with which information is recorded by magnetic transfer, and in case 12 equips magnetic-transfer equipment with the slave disk 11, it is a pin center,large hole for regulating the center position of 11 of a slave disk.
[0026] Operation of this magnetic-transfer equipment is roughly divided into the three-stage, and is explained below. First, the 1st phase is explained using drawing 2 . The pin center,large hole 12 of the slave disk 11 is inserted in the spindle 3 of a master 1. And position regulation of the slave disk 11 is once carried out in a position in which the front face has the crevice along which does not contact the front face of a master 1 but air passes. In this state, an exhaust valve 8 is closed, an inlet valve 10 is opened, and the inhalation-of-air pump 9 is operated.
[0027] Since the air hole 5 is formed in the master 1 near [the] the center as shown in drawing 1 , with the inhalation-of-air pump 9, the air fed by the chamber 6 passes along an air hole 5, and is introduced into a slot 4. The air introduced into the slot 4 spreads toward a periphery through a slot 4 near the center of a master 1. And it escapes from a slot 4 to the atmosphere through the crevice between a master 1 and the slave disk 11 further.
[0028] The detailed dust adhering to the front face of a master 1 or the slave disk 11 is discharged with air by the flow of this air to the atmosphere.
[0029] Next, the 2nd phase is explained using drawing 3 . The inhalation-of-air pump 9 is stopped and an inlet valve 10 is closed. And the slave disk 11 is put on a master 1. Then, an exhaust valve 8 is opened and the exhaust air pump 7 is operated. The air of the slot 4 interior is discharged and the pressure of the space of the slot 4 closed with the slave disk 11 becomes lower than atmospheric pressure. therefore, the slave disk 11 -- atmospheric pressure 13 -- a master 1 -- forcing **
[0030] Consequently, the imprint field and the slave disk 11 of a master 1 stick. A magnetic field required for an imprint is impressed in this state.
[0031] Finally, drawing 4 is used and the 3rd phase is explained. If an imprint is completed, the exhaust air pump 7 will be stopped and an exhaust valve 8 will be closed. Next, an inlet valve 10 is opened and the inhalation-of-air pump 9 is operated. With the inhalation-of-air pump 9, the air fed by the chamber 6

passes along an air hole 5, and is introduced into a slot 4. The space of the slot 4 interior closed with the slave disk 11 becomes higher than atmospheric pressure. Consequently, pneumatic pressure 14 acts on the slave disk 11, and the slave disk 11 exfoliates from a master 1.
[0032] As explained above, while the detailed dust which adhered to the master 1 or the slave disk 11 just before the imprint is removed according to the form of this operation, it can stick with a master 1 over the whole surface of the slave disk 11 by suction by the slot 4 arranged at the radial. Furthermore, the master 1 and the slave disk 11 which were stuck can be exfoliated reasonable by pneumatic pressure.

[0033] Consequently, the reliability of an imprint is very high.
(Form 2 of operation) The magnetic-transfer equipment concerning the form 2 of operation of this invention is explained using drawing 5 .
[0034] Drawing 5 is drawing explaining the imprint side and cross section of a master 1 of this magnetic-transfer equipment. Two or more holes 15 located in a line with the radial are formed in the master 1 of this magnetic-transfer equipment. The hole 15 leads to the chamber 6. That is, in the form 1 of operation, two or more holes 15 are formed instead of the slot 4 for attracting the slave disk 11 or exfoliating in pneumatic pressure, and the operation is the same as a slot 4. Since operation of the magnetic-transfer equipment in the form of this operation is completely the same as the form 1 of operation, explanation is omitted.
[0035] With the form of this operation, since the arrangement of a hole is free as compared with a slot, arrangement is optimized, deformation at the time of suction of the slave disk 11 is lessened, and it has the effect that it is possible to raise adhesion more.
[0036] (Form 3 of operation) The magnetic-transfer equipment concerning the form 3 of operation is explained using drawing 6 or drawing 9 .
[0037] In this magnetic-transfer equipment, as shown in drawing 6 , the slave disk 11 which formed the key seat 16 in the pin center,large hole 12 is used. Moreover, as shown in drawing 7 , the locator key 19 is formed in the spindle 3 at the master A17 and the master B18. Since the key seat 16 of the slave disk 11 fits each other into a locator key 19, a master A17 and a master B18 are equipped with the slave disk 11 with a fixed angle phase by the direction of a locator key 19. The sense of the locator key 19 of a master A17 is in agreement in the direction of nine arms of a slot 4. On the other hand, the sense of the locator key 19 of a master B18 has turned to between the arm of a slot 4, and arms.
[0038] Next, operation of this magnetic-transfer equipment is explained using drawing 8 and drawing 9 . The 1st imprint is performed using introduction and a master A17. Since the locator key 19 of a master A17 fits each other into the key seat 16 of the slave disk 11 at this time, an imprint is performed to the regular angular position as shown in the imprint pattern A of drawing 8 to the position of a key seat 16 at the slave disk 11. Since it is the same as the gestalt 1 of operation, the process which imprints is skipped.
[0039] Next, it imprints using a master B18 to the slave disk 11. Like the 1st imprint, since the locator key 19 of a master B18 fits each other into the key seat 16 of the slave disk 11, an imprint is performed to the regular angular position as shown in the imprint pattern B of drawing 9 to the position of a key seat 16 at the slave disk 11. Consequently, as shown in drawing 9 , the imprint pattern B21 is formed between the imprint patterns A20.
[0040] If the magnetic-transfer equipment of the form of this operation is used as explained above, the thing of the slave disk 11 mostly acquired for an imprint pattern over all peripheries will become possible.
[0041] (Form 4 of operation) Drawing 6 , drawing 8 , and drawing 9 are used for drawing 10 and a row, and the magnetic-transfer equipment concerning the form 4 of operation of this invention is explained. With this magnetic-transfer equipment, as shown in drawing 6 , the slave disk 11 which formed the key seat 16 in the pin center,large hole 12 is used. Drawing 10 is the cross section of this magnetic-transfer equipment. A locator key 19 is formed in a spindle 3, and a rotation drive is carried out by the spindle motor 22.
[0042] First, in order to perform the 1st imprint, it equips with the slave disk 11 so that the key seat may

fit each other into the locator key 19 of a spindle 3. Since it is the same as the process explained with the form 1 of operation, the process of the 1st imprint is skipped. The portion which is equivalent to the slot 4 of a master 1 as the imprint pattern of the slave disk 11 in the time of the 1st imprint being completed is shown in drawing 8 is not imprinted. After the 1st imprint is completed, an exhaust valve 8 is closed, an inlet valve 10 is opened wide, and the inhalation-of-air pump 9 operates. The slave disk 11 exfoliates from a master 1 by the pneumatic pressure introduced into the slot 4, and it rises to surface from a master 1 by pneumatic pressure further.

[0043] Maintaining this state, a spindle motor 22 is driven and a spindle is rotated. The rotation drive of the slave disk 11 is carried out by the locator key 19. an angle predetermined in the slave disk 11 -- if a rotation drive is carried out, a spindle motor 22 and the inhalation-of-air pump 9 will stop And an inlet valve 10 is closed and the 2nd imprint is performed like the 1st imprint. The imprint pattern of the slave disk 11 in the time of the 2nd imprint being completed becomes like drawing 9 . However, the imprint pattern A20 obtained by the 1st imprint with the form of this operation and the imprint pattern B obtained by the 2nd imprint cannot surely be overemphasized as the same thing and the same bird clapper.

[0044] If the magnetic-transfer equipment of the form of this operation is used as explained above, the thing of the slave disk 11 mostly acquired for the imprint pattern of a repeat over all peripheries will become possible. Moreover, since it is made to rotate, surfacing the slave disk 11 by pneumatic pressure, there is no possibility of getting damaged while the slave disk 11 rotates.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing explaining the composition of the magnetic-transfer equipment by the gestalt 1 of operation of this invention
[Drawing 2] The cross section explaining this operation
[Drawing 3] The cross section explaining this operation
[Drawing 4] The cross section explaining this operation
[Drawing 5] Drawing explaining the composition of the magnetic-transfer equipment by the gestalt 2 of operation of this invention
[Drawing 6] Drawing explaining the slave disk used for the magnetic-transfer equipment by the gestalt 3 of operation of this invention
[Drawing 7] Drawing explaining the composition of the magnetic-transfer equipment by the gestalt 3 of operation of this invention
[Drawing 8] Drawing explaining this operation
[Drawing 9] Drawing explaining this operation
[Drawing 10] The cross section explaining the composition and operation of magnetic-transfer equipment by the gestalt 4 of operation of this invention
[Drawing 11] The cross section explaining the conventional composition and conventional operation of magnetic-transfer equipment
[Description of Notations]
1 Master
2 Imprint Field
3 Spindle
4 Slot
5 Air Hole
6 Chamber
7 Exhaust Air Pump
8 Exhaust Valve
9 Inhalation-of-Air Pump
10 Inlet Valve
11 Slave Disk
12 Pin Center,large Hole
13 Atmospheric Pressure
14 Pneumatic Pressure
15 Hole
16 Key Seat
17 Master A
18 Master B
19 Locator Key

20 Imprint Pattern A
21 Imprint Pattern B
22 Spindle Motor
31 Master Medium
32 Master Medium
33 Slave Medium
34 Periphery Specification-Part Material
35 Air Hole
36 Annular Section
36a Paries medialis orbitae
37 Centrum
38 Air Vent -- Hole
39 Outside Wall
40 Air Suction Duct
41 Sticking-by-Pressure Ring
42 Sticking-by-Pressure Ring
43 Magnetic Field Generating Coil
44 Magnetic Field Generating Coil

[Translation done.]

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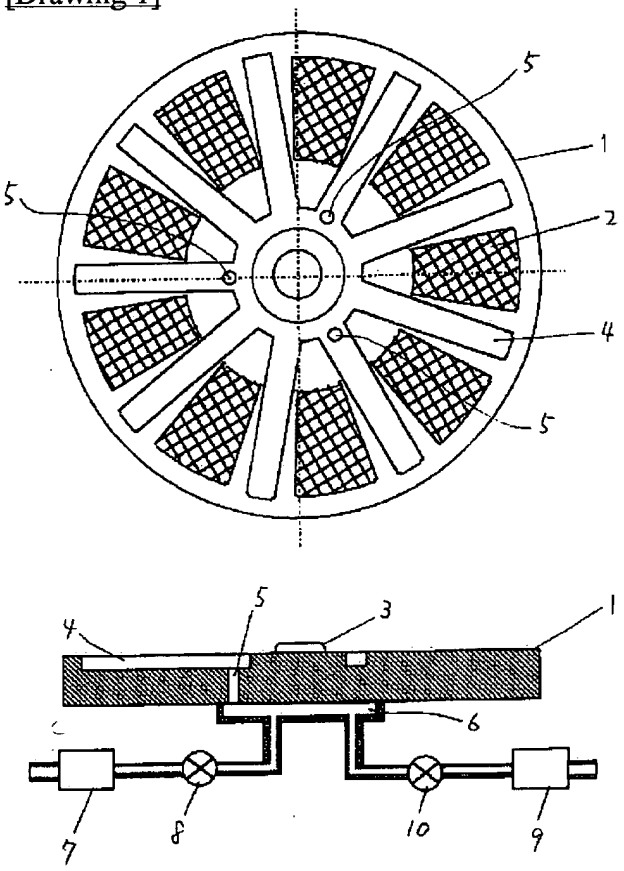
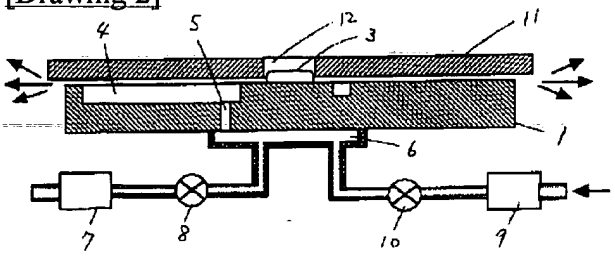
DRAWINGS

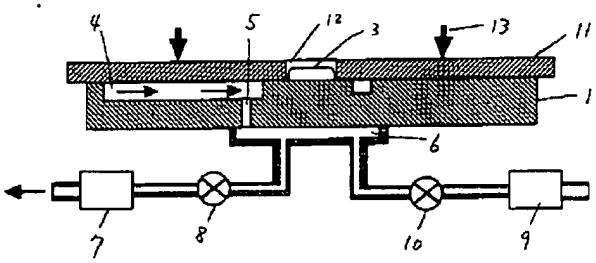
[Drawing 1]



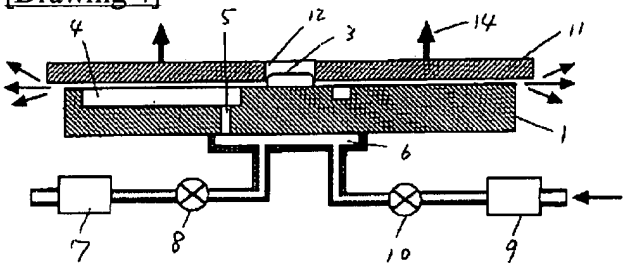
[Drawing 2]



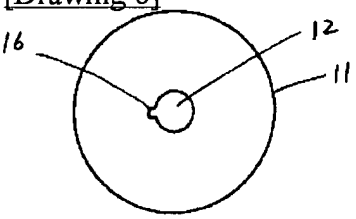
[Drawing 3]



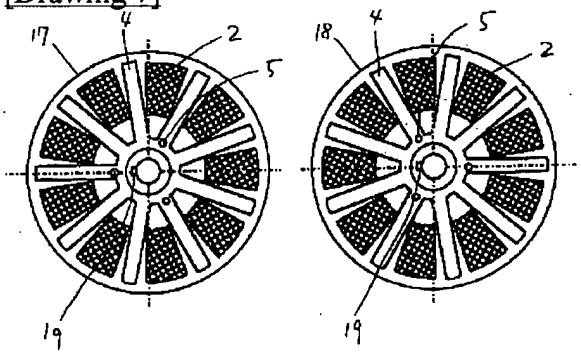
[Drawing 4]



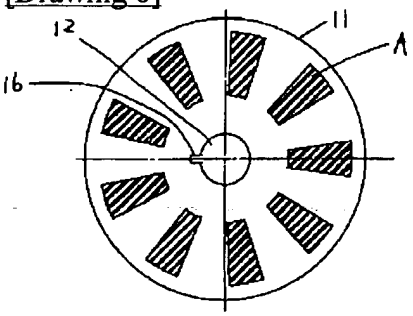
[Drawing 6]



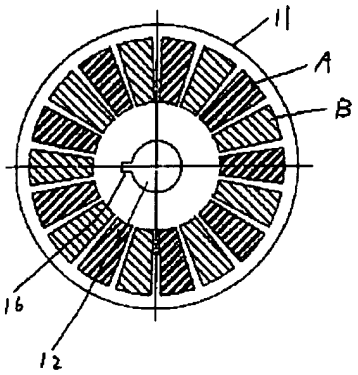
[Drawing 7]



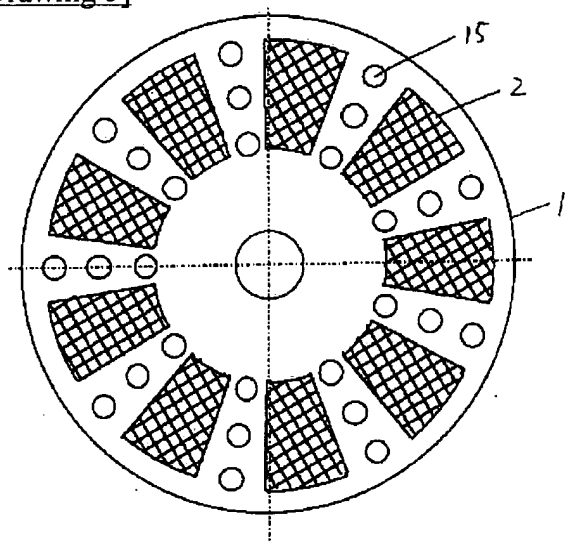
[Drawing 8]

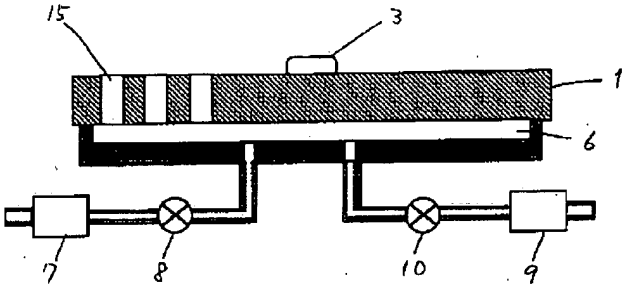


[Drawing 9]

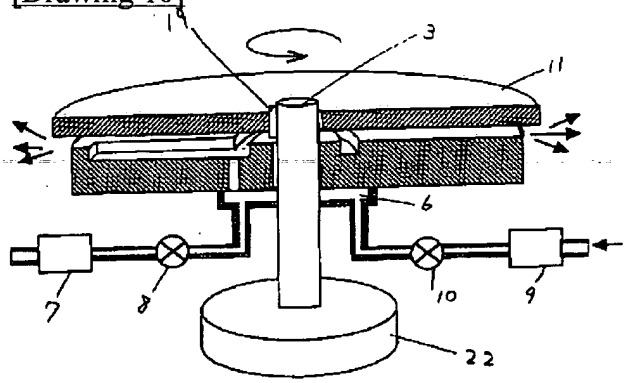


[Drawing 5]

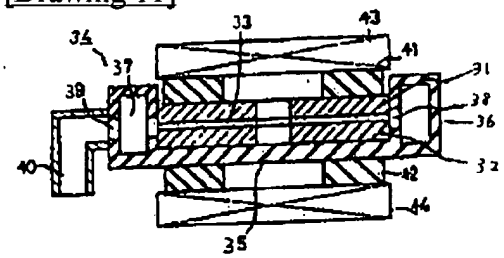


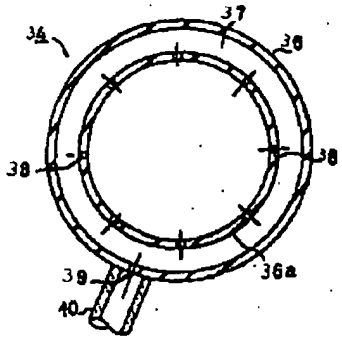


[Drawing 10]



[Drawing 11]





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